

FIG. 1

20277000-95252550-0110

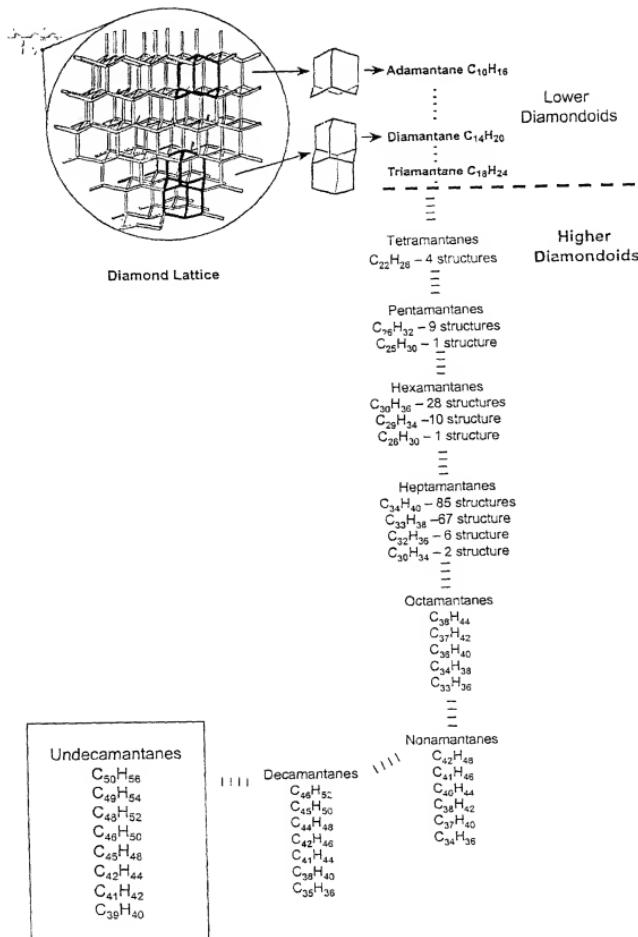


FIG. 2

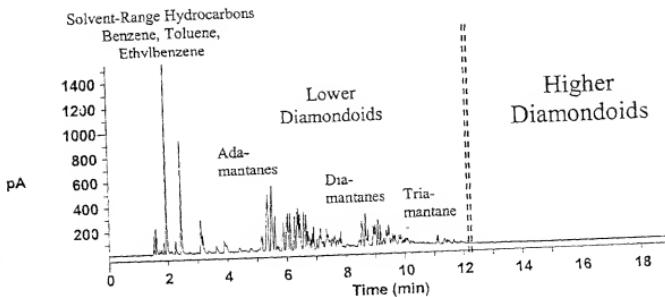
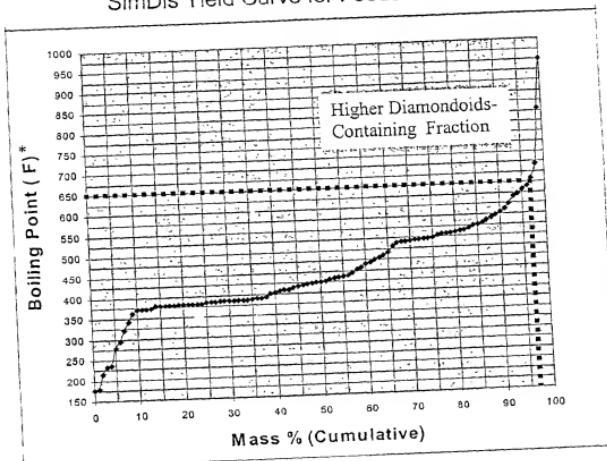


FIG. 3

SimDis Yield Curve for Feedstock B



* Atmospheric-Equivalent

FIG. 4

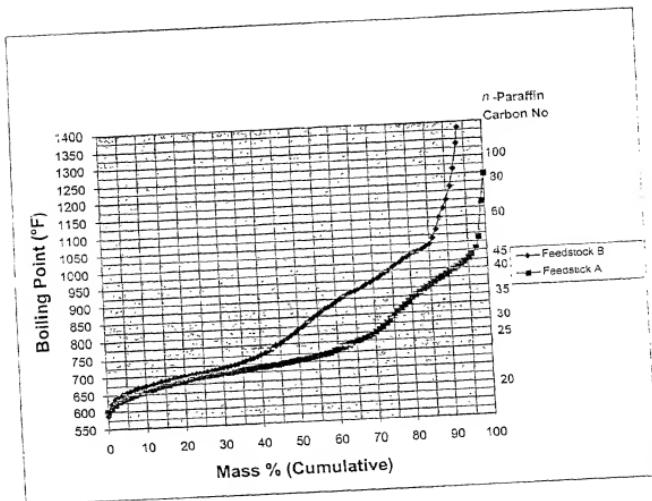
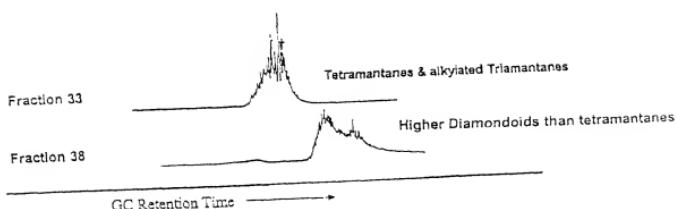
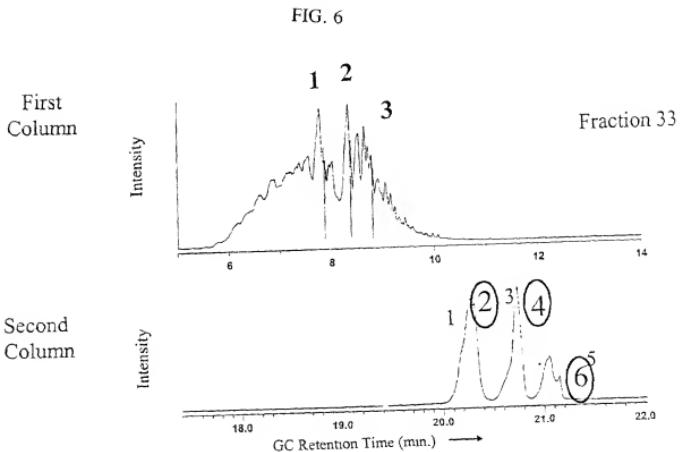


FIG. 5



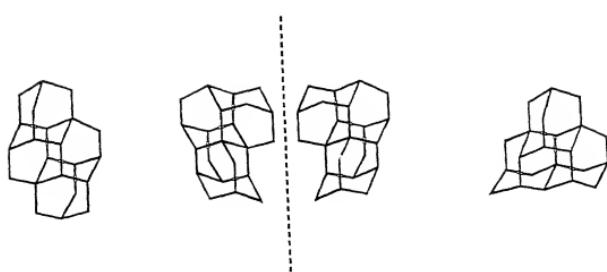


14
13
12
11
10
9
8
7
6
5
4
3
2
1

Second Column
Intensity

FIG. 7

mirror plane



[121] Tetramantane

[123] Tetramantane
(ENANTIOMERS)

[1(2)3] Tetramantane

FIG. 8A

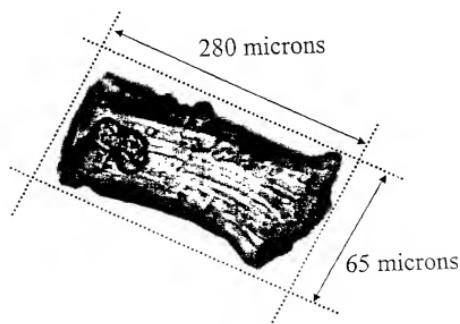


FIG. 8B

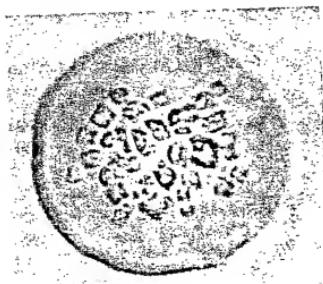


FIG. 8C

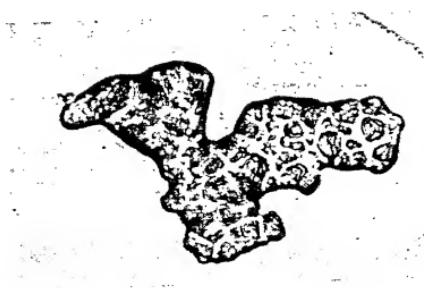


FIG. 9

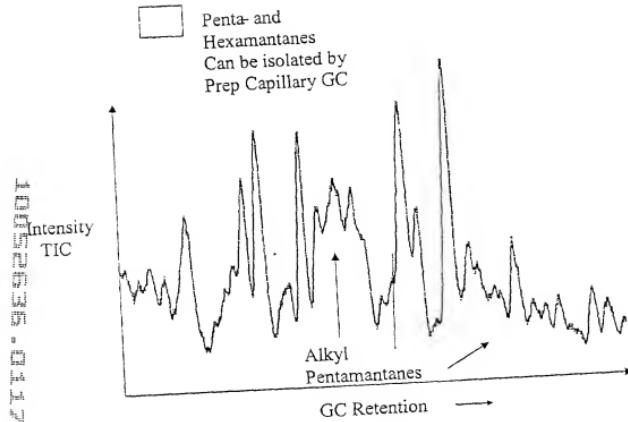


FIG. 10

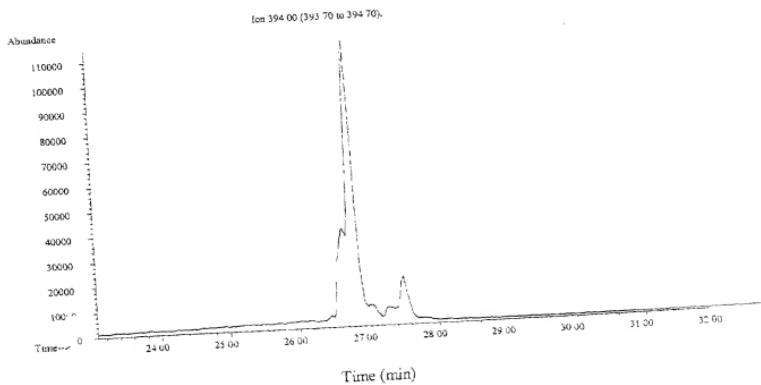


FIG. 11

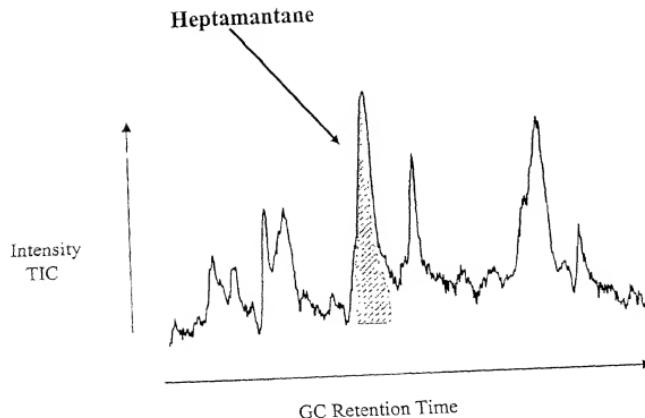


FIG. 12

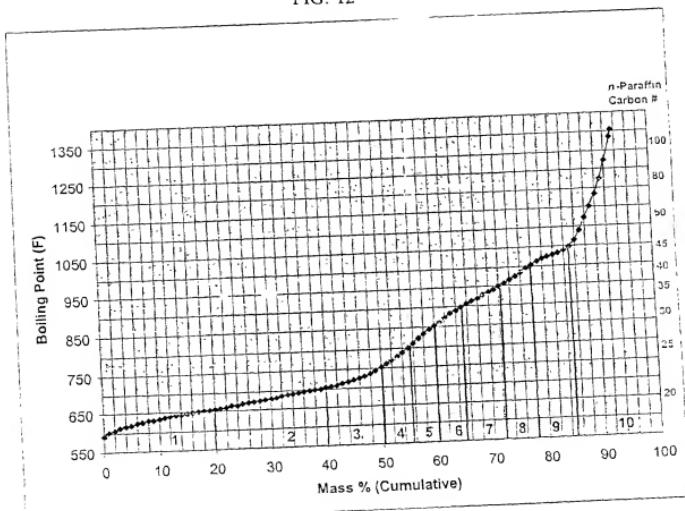
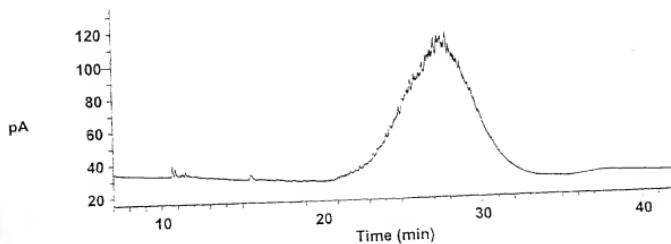


FIG. 13



005950-781-00000000000000000000000000000000

FIG. 14

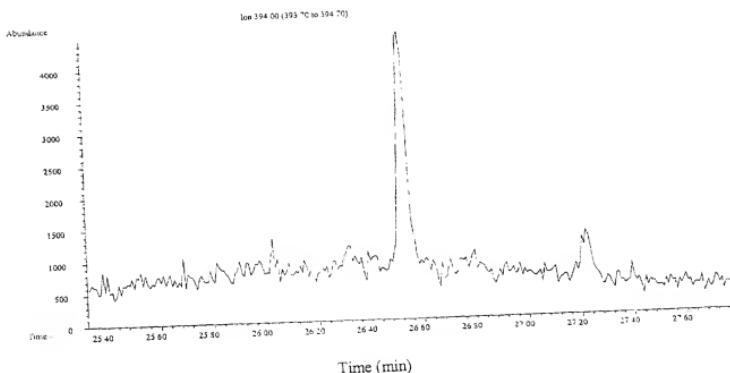
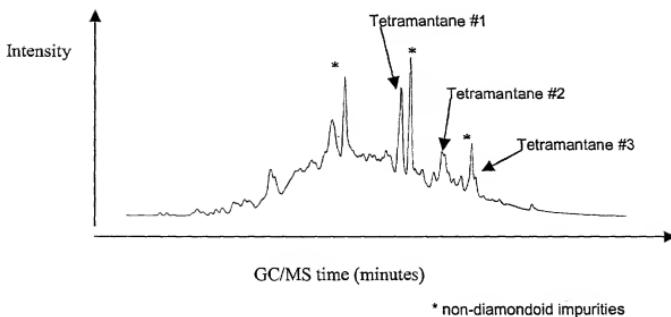


FIG. 15



100502635-011772

FIG. 16

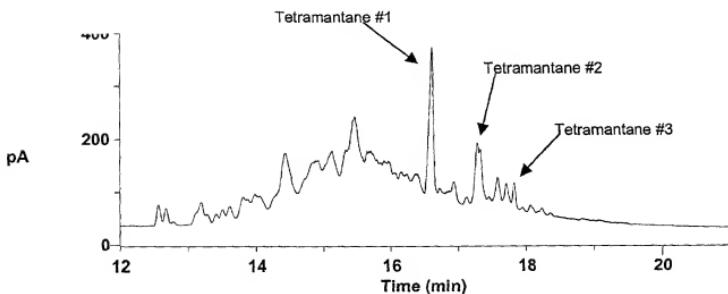


FIG. 17

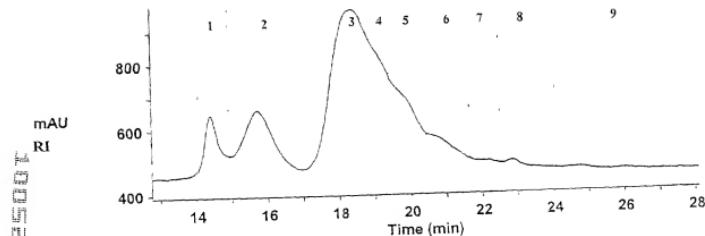


FIG. 18

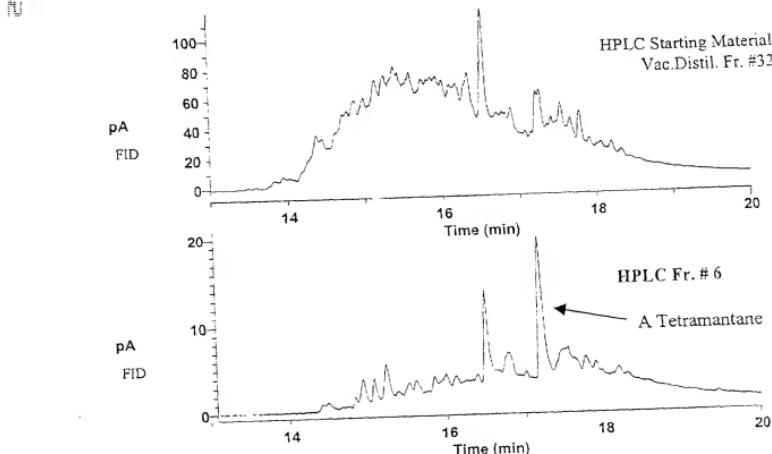


FIG. 19

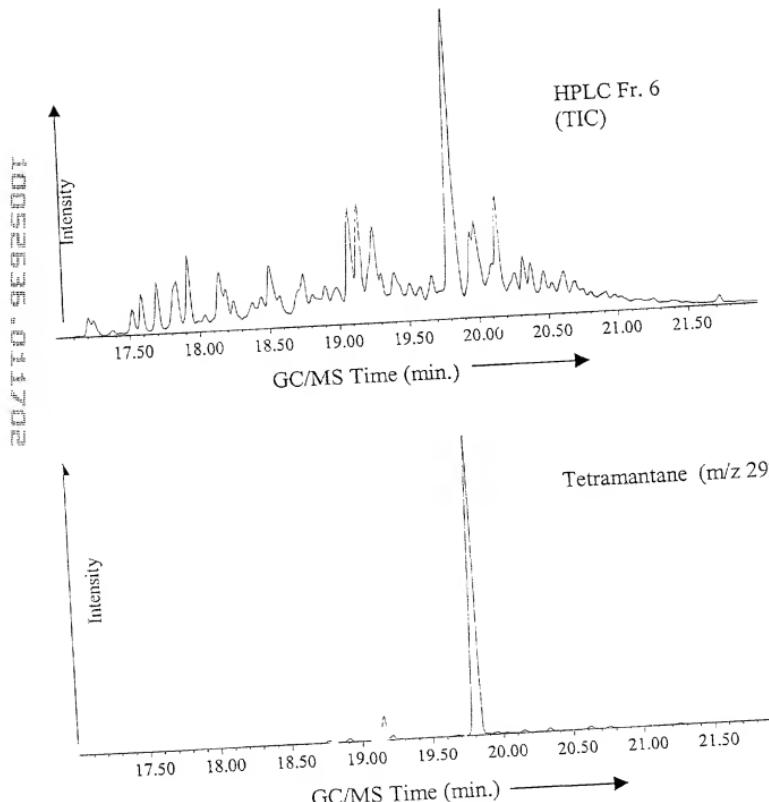


FIG. 20

20050226-014702

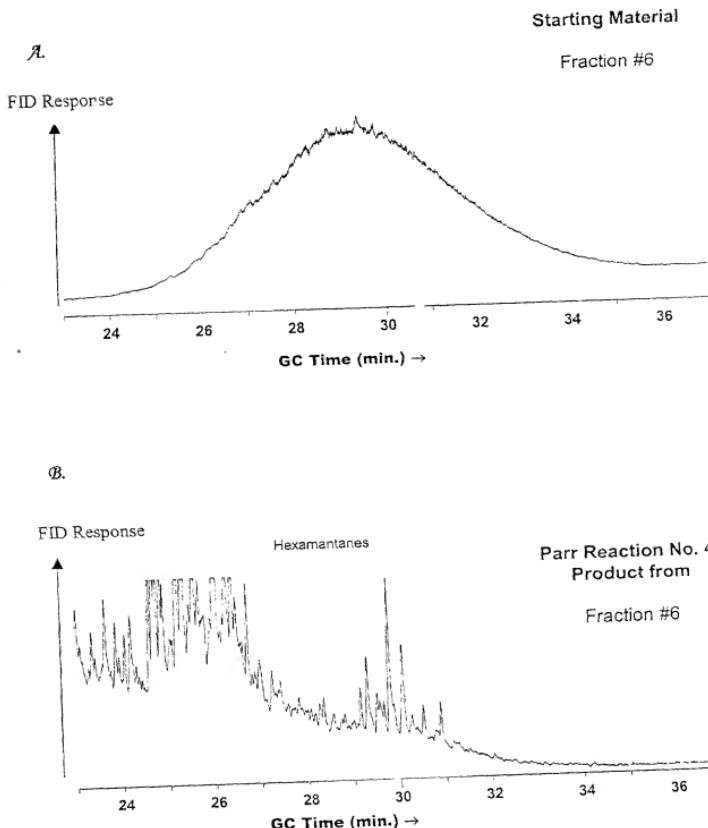


FIG. 21

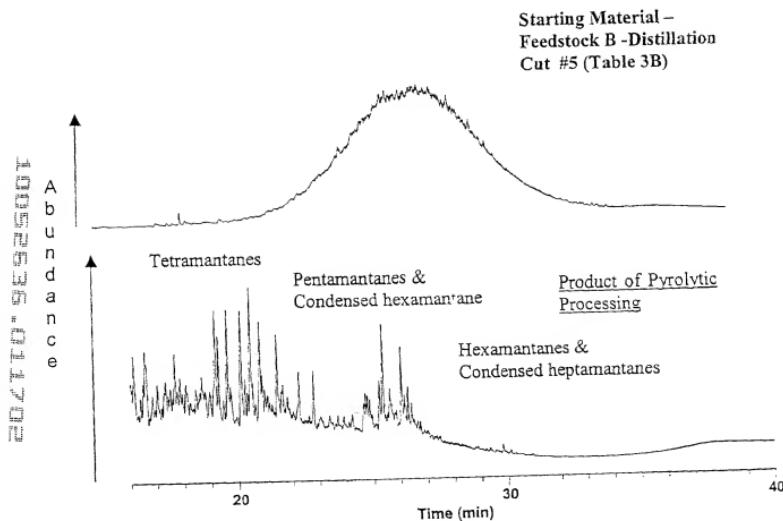


FIG. 22

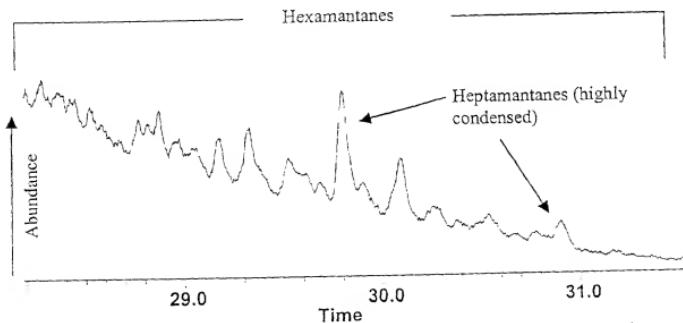


FIG. 23

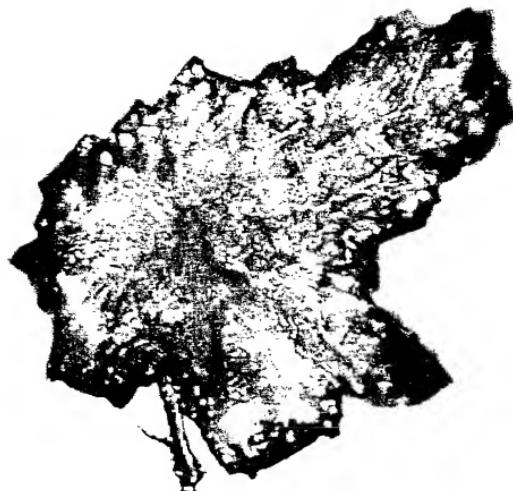
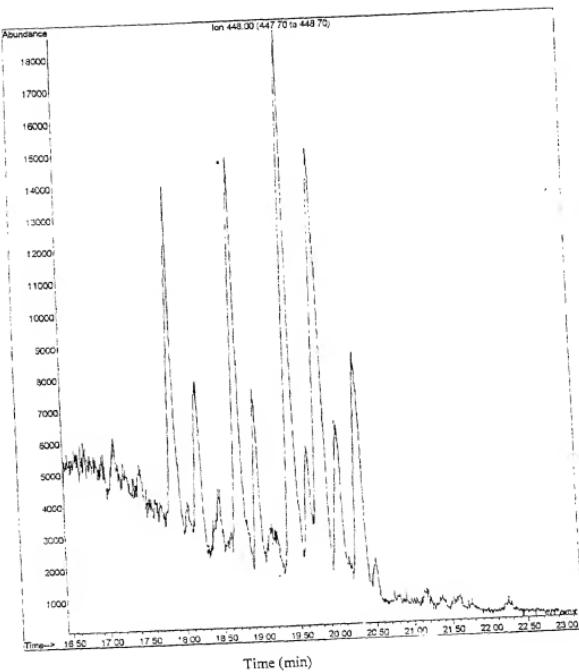
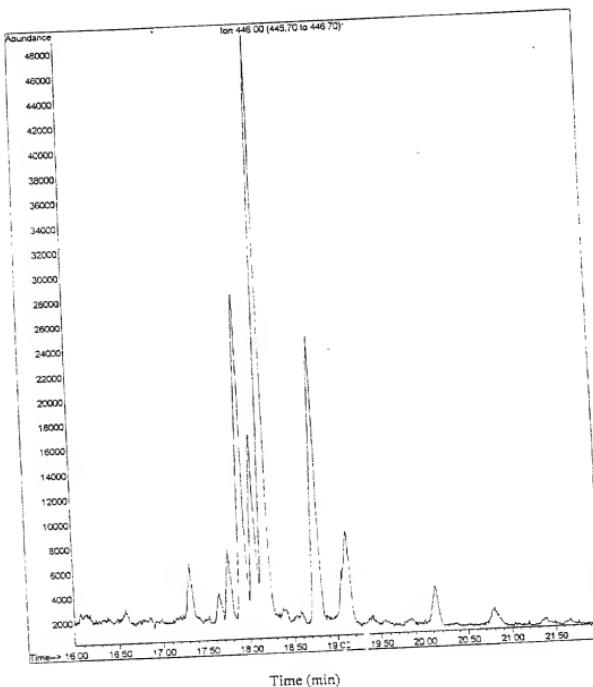


FIG. 24



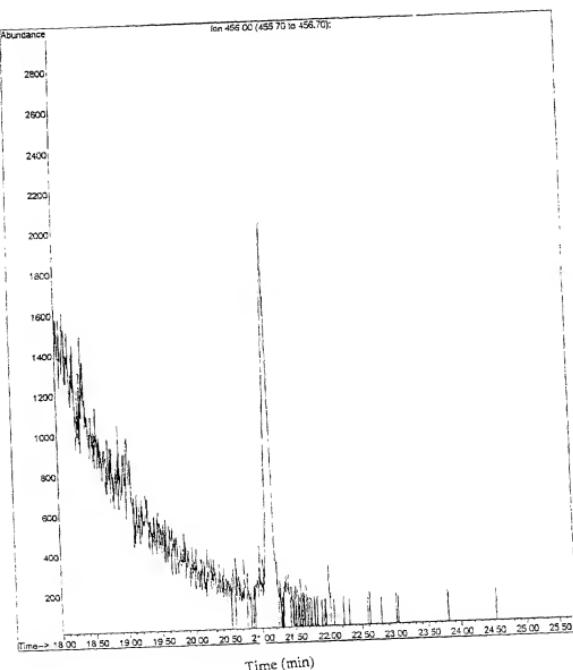
005950-781

FIG. 25



10052636.011702

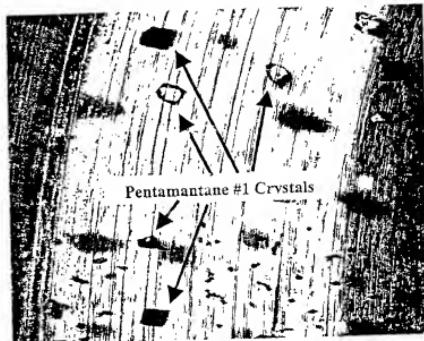
FIG. 26



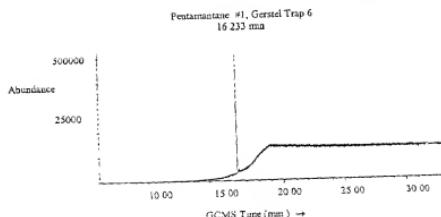
200702-011192500

FIG. 27

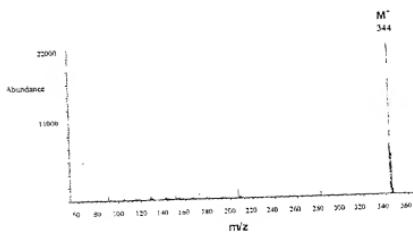
A.



B.

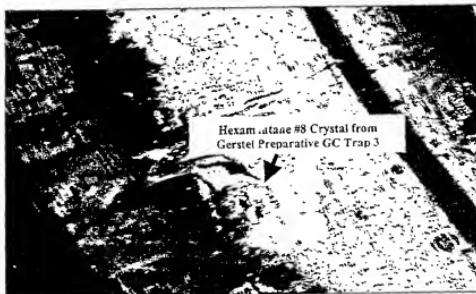


C.



1005950-781-012221

FIG. 28

A.

6203/2770 "352500 T

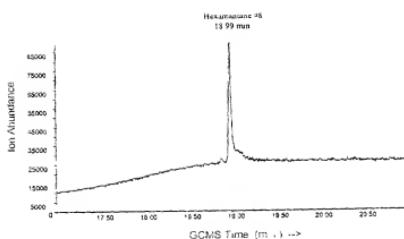
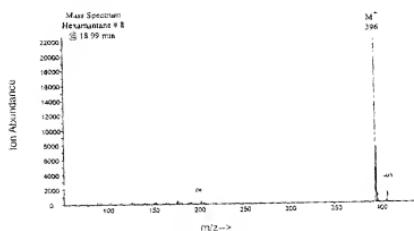
B.*C.*

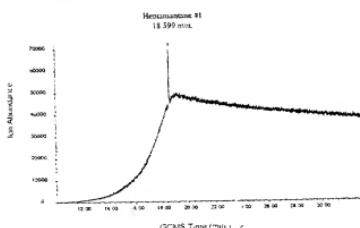
FIG. 29

A.

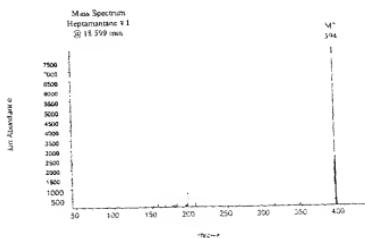


Heptamantane #1 Crystals

B.



C.



100152636 - 011772

| Number of Diamond Crystal Cage Units | Number of Molecular Formulae | Higher Diamondoid | Molecular Weights |
|--------------------------------------|------------------------------|-------------------|-------------------|
| 4 | 1 | Tetramantane | 292 |
| 5 | 2 | Pentamantane | 344 |
| 6 | 3 | Hexamantane | 396 |
| 7 | 4 | Heptamantane | 448 |
| 8 | 5 | Octamantane | 500 |
| 9 | 6 | Nonamantane | 552 |
| 10 | 7 | Decamantane | 604 |
| 11 | 8 | Undecamantane | 656 |

FIG. 31

| | | | | | | | | | |
|-------------------|---------------|---------------|-------------------|--------------|---------------|--------------|--------------|--------------|----------------|
| Higher Diamondoid | Tetramantanes | Pentamantanes | Cyclohexamantanes | Hexamantanes | Heptamantanes | Octamantanes | Nonamantanes | Decamantanes | Undecamantanes |
|-------------------|---------------|---------------|-------------------|--------------|---------------|--------------|--------------|--------------|----------------|

FIG. 32

FIG. 33

| Hypercarb HPLC Fraction # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | Fully Condensed Hexamantane |
|---------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|-----------------------------------|
| 1 | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | |
| 26 | | | | | | | | | | | | | | | | | | |
| 27 | | | | | | | | | | | | | | | | | | Hex 13 |
| 28 | | | | | | | | | | | | | | | | | | Hex 14 |
| 29 | | | | | | | | | | | | | | | | | | Hex 1 |
| 30 | x | | | | | | | | | | | | | | | | | Hex 10 |
| 31 | | | | | | | | | | | | | | | | | | Hex 11 |
| 32 | | | | | | | | | | | | | | | | | | |
| 33 | | | | | | | | | | | | | | | | | | |
| 34 | | | | | | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | | | Hex 6 |
| 44 | | | | x | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | | | | | | | |
| 48 | | | | | | | | | | | | | | | | | | Hex 15 |
| 49 | | | | | | | | | | | | | | | | | | Hex 9 |
| 50 | | | | | | | | | | | | | | | | | | |
| 51 | | | | | | | | | | | | | | | | | | |
| 52 | | | | | | | | | | | | | | | | | | |
| 53 | | | | | | | | | | | | | | | | | | Hex 2 |
| 54 | x | | | | | | | | | | | | | | | | | |
| 55 | | | | | | | | | | | | | | | | | | |
| 56 | | | | | | | | | | | | | | | | | | |
| 57 | | | | | | | | | | | | | | | | | | |
| 58 | | | | | | | | | | | | | | | | | | |
| 59 | | | | | | | | | | | | | | | | | | |
| 60 | | | | | | | | | | | | | | | | | | |
| 61 | | | | | | | | | | | | | | | | | | |
| 62 | | | | | | | | | | | | | | | | | | |
| 72 | | | | | | | | | | | | | | | | | | |
| 73 | | | | | | | | | | | | | | | | | | |
| 74 | | | | | | | x | | | | | | | | | | | Hex 7 |
| 75 | | | | | | | | | | | | | | | | | | |
| 76 | | | | | | | | | | | | | | | | | | |
| 77 | | | | | | | | | | | | | | | | | | |
| 78 | | | | | | | | | | | | | | | | | | |
| 84 | | | | | | | | | | | | | | | | | | |

20100526201712

FIG. 34

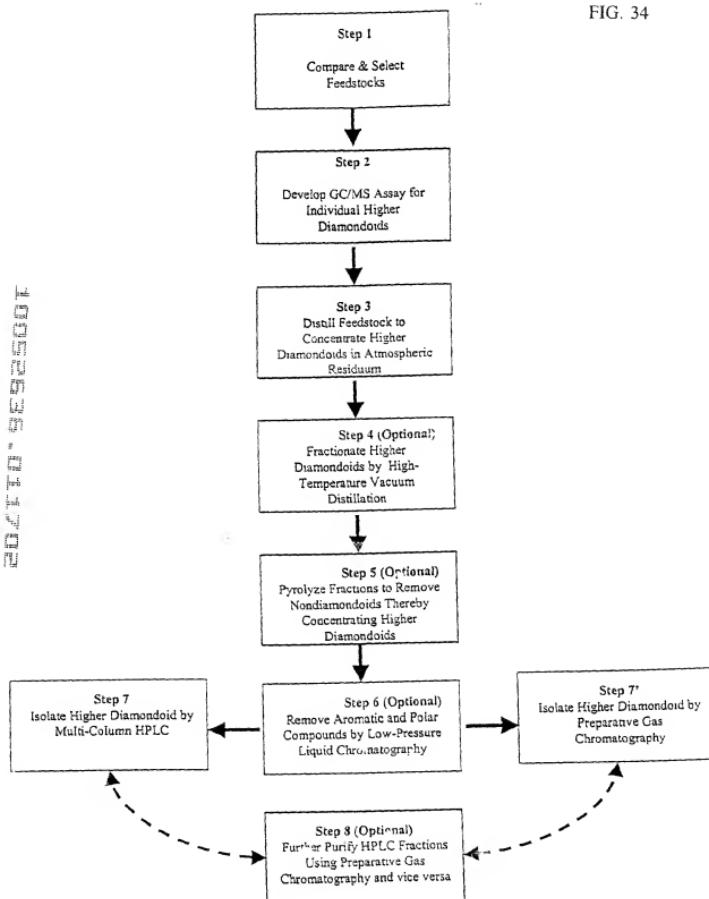


FIG. 35A

| Higher Diamondoid | Compound Reference Number | M+ (m/z) (Equals Base Peak) | GC/MS Retention Times* (min.) | GC/MS Relative Retention Times** (min.) |
|-------------------|---------------------------|-----------------------------|-------------------------------|---|
| Tetramantane #1 | 4-1 | 292 | 8.10 | 1.00 |
| Tetramantane #2 | 4-2 | 292 | 8.66 | 1.07 |
| Tetramantane #3 | 4-3 | 292 | 9.12 | 1.13 |
| Pentamantane #1 | 5-1 | 344 | 10.40 | 1.28 |
| Pentamantane #2 | 5-2 | 344 | 11.93 | 1.47 |
| Pentamantane #3 | 5-3 | 344 | 11.98 | 1.48 |
| Pentamantane #4 | 5-4 | 344 | 12.38 | 1.53 |
| Pentamantane #5 | 5-5 | 344 | 12.50 | 1.54 |
| Pentamantane #6 | 5-6 | 344 | 12.71 | 1.57 |
| Cyclohexamantane | C-5 | 342 | 12.34 | 1.52 |
| Hexamantane #1 | 6-1 | 396 | 14.46 | 1.78 |
| Hexamantane #2 | 6-2 | 396 | 14.61 | 1.80 |
| Hexamantane #3 | 6-3 | 396 | 14.97 | 1.85 |
| Hexamantane #4 | 6-4 | 396 | 14.99 | 1.85 |
| Hexamantane #5 | 6-5 | 396 | 15.04 | 1.86 |
| Hexamantane #6 | 6-6 | 396 | 15.13 | 1.87 |
| Hexamantane #7 | 6-7 | 396 | 15.22 | 1.88 |
| Hexamantane #8 | 6-8 | 396 | 15.32 | 1.89 |
| Hexamantane #9 | 6-9 | 396 | 15.42 | 1.90 |
| Hexamantane #10 | 6-10 | 396 | 15.45 | 1.91 |
| Hexamantane #11 | 6-11 | 396 | 15.49 | 1.91 |
| Hexamantane #12 | 6-12 | 396 | 15.54 | 1.92 |
| Hexamantane #13 | 6-13 | 396 | 15.60 | 1.93 |
| Hexamantane #14 | 6-14 | 396 | 15.81 | 1.95 |
| Hexamantane #15 | 6-15 | 396 | 15.89 | 1.96 |
| Hexamantane #16 | 6-16 | 396 | 16.05 | 1.98 |
| Hexamantane #17 | 6-17 | 396 | 16.08 | 1.99 |
| Heptamantane #1 | 7-1 | 394 | 14.96 | 1.85 |
| Heptamantane #2 | 7-2 | 394 | 15.53 | 1.92 |
| Heptamantane #3 | 7-3 | 448 | 17.34 | 2.14 |
| Heptamantane #4A | 7-4A | 448 | 17.70 | 2.18 |
| Heptamantane #4B | 7-4B | 448 | 17.70 | 2.18 |
| Heptamantane #5 | 7-5 | 448 | 17.71 | 2.19 |
| Heptamantane #6 | 7-6 | 448 | 17.79 | 2.20 |
| Heptamantane #7 | 7-7 | 448 | 17.82 | 2.20 |
| Heptamantane #8 | 7-8 | 448 | 17.99 | 2.22 |
| Heptamantane #9A | 7-9A | 448 | 18.13 | 2.24 |
| Heptamantane #9B | 7-9B | 448 | 18.13 | 2.24 |
| Heptamantane #9C | 7-9C | 448 | 18.13 | 2.24 |
| Heptamantane #10 | 7-10 | 448 | 18.15 | 2.24 |
| Heptamantane #11 | 7-11 | 448 | 18.20 | 2.25 |
| Heptamantane #12 | 7-12 | 448 | 18.21 | 2.25 |
| Heptamantane #13A | 7-13A | 448 | 18.29 | 2.26 |
| Heptamantane #13B | 7-13B | 448 | 18.29 | 2.26 |
| Heptamantane #13C | 7-13C | 448 | 18.29 | 2.26 |
| Heptamantane #14 | 7-14 | 448 | 18.32 | 2.26 |

FIG. 35A cont'd

| Higher Diamondoid | Compound Reference Number | M+ (m/z) (Equals Base Peak) | GC/MS Retention Times* (min.) | GC/MS Relative Retention Times** (min.) |
|-------------------|---------------------------|-----------------------------|-------------------------------|---|
| Octamantane #1 | 8-1 | 446 | 17.30 | 2.14 |
| Octamantane #2 | 8-2 | 446 | 17.37 | 2.14 |
| Octamantane #3 | 8-3 | 446 | 17.42 | 2.15 |
| Octamantane #4 | 8-4 | 446 | 17.47 | 2.16 |
| Octamantane #5 | 8-5 | 446 | 17.71 | 2.19 |
| Octamantane #6 | 8-6 | 446 | 17.82 | 2.20 |
| Octamantane #7 | 8-7 | 446 | 17.86 | 2.20 |
| Octamantane #8 | 8-8 | 446 | 18.22 | 2.25 |
| Octamantane #9 | 8-9 | 446 | 18.46 | 2.28 |
| Octamantane #10 | 8-10 | 446 | 18.65 | 2.30 |
| Octamantane #11 | 8-11 | 446 | 18.76 | 2.32 |
| Nonamantane #1 | 9-1 | 498 | 19.86 | 2.45 |
| Decamantane #1 | 10-1 | 456 | 18.57 | 2.29 |
| Decamantane #2 | 10-2 | 496 | 21.33 | 2.63 |
| Undecamantane #1 | 11-1 | 508 | 21.05 | 2.60 |

*HP-5840 (30 m x 0.25 mm, 0.25 micron film), helium carrier gas.

• HP-MS5 (30m x 0.25 mm, 0.25

FIG. 35B

| Higher Diamondoid | Compound Reference Number | Fraction Number | Elution Time (min.) | Elution Volume (mL) | Elution Volume Relative to 4-1 |
|-------------------|---------------------------|-----------------|---------------------|---------------------|--------------------------------|
| Tetramantane #1 | 4-1 | 4 | 119 | 59; | 1.00 |
| Tetramantane #2 | 4-2 | 7 | 125 | 627 | 1.05 |
| Tetramantane #3 | 4-3 | 6 | 123 | 616 | 1.04 |
| Pentamantane #1 | 5-1 | 11 | 134 | 669 | 1.13 |
| Pentamantane #2 | 5-2 | 19 | 151 | 754 | 1.27 |
| Pentamantane #3 | 5-3 | 28 | 170 | 850 | 1.43 |
| Pentamantane #4 | 5-4 | 22 | 157 | 786 | 1.32 |
| Pentamantane #5 | 5-5 | 19 | 151 | 754 | 1.27 |
| Pentamantane #6 | 5-6 | 20 | 153 | 765 | 1.29 |
| Cyclohexamantane | C-6 | 23 | 159 | 797 | 1.34 |
| Hexamantane #1 | 6-1 | 33 | 181 | 903 | 1.52 |
| Hexamantane #2 | 6-2 | 29 | 172 | 861 | 1.45 |
| Hexamantane #3 | 6-3 | 43 | 202 | 1012 | 1.70 |
| Hexamantane #4 | 6-4 | 33 | 181 | 903 | 1.52 |
| Hexamantane #5 | 6-5 | 35 | 185 | 924 | 1.56 |
| Hexamantane #6 | 6-6 | 63 | 242 | 1211 | 2.04 |
| Hexamantane #7 | 6-7 | 37 | 189 | 945 | 1.59 |
| Hexamantane #8 | 6-8 | 39 | 193 | 967 | 1.63 |
| Hexamantane #9 | 6-9 | 39 | 193 | 967 | 1.63 |
| Hexamantane #10 | 6-10 | 48 | 214 | 1071 | 1.80 |
| Hexamantane #11 | 6-11 | 36 | 187 | 935 | 1.57 |
| Hexamantane #12 | 6-12 | 44 | 205 | 1024 | 1.72 |
| Hexamantane #13 | 6-13 | 36 | 187 | 935 | 1.57 |
| Hexamantane #14 | 6-14 | 39 | 193 | 967 | 1.63 |
| Hexamantane #15 | 6-15 | 45 | 207 | 1036 | 1.74 |
| Hexamantane #16 | 6-16 | 44 | 205 | 1024 | 1.72 |
| Hexamantane #17 | 6-17 | 49 | 217 | 1083 | 1.82 |
| Heptamantane #1 | 7-1 | 45 | 207 | 1036 | 1.74 |
| Heptamantane #2 | 7-2 | 41 | 198 | 989 | 1.66 |
| Heptamantane #3 | 7-3 | 61 | 238 | 1190 | 2.00 |
| Heptamantane #4A | 7-4A | 90 | 304 | 1519 | 2.56 |
| Heptamantane #4B | 7-4B | 90 | 304 | 1519 | 2.56 |
| Heptamantane #5 | 7-5 | 76 | 270 | 1349 | 2.27 |
| Heptamantane #6 | 7-6 | 67 | 251 | 1253 | 2.11 |
| Heptamantane #7 | 7-7 | — | — | — | — |
| Heptamantane #8 | 7-8 | 59 | 234 | 1172 | 1.97 |
| Heptamantane #9A | 7-9A | 60 | 236 | 1181 | 1.99 |
| Heptamantane #9B | 7-9B | 62 | 240 | 1200 | 2.02 |
| Heptamantane #9C | 7-9C | 78 | 274 | 1370 | 2.31 |
| Heptamantane #10 | 7-10 | 86 | 291 | 1455 | 2.45 |
| Heptamantane #11 | 7-11 | — | — | — | — |
| Heptamantane #12 | 7-12 | — | — | — | — |
| Heptamantane #13A | 7-13A | 58 | 233 | 1163 | 1.96 |
| Heptamantane #13B | 7-13B | 74 | 266 | 1328 | 2.24 |
| Heptamantane #13C | 7-13C | 90 | 304 | 1519 | 2.56 |
| Heptamantane #14 | 7-14 | 70 | 257 | 1285 | 2.16 |

FIG. 35B cont'd

| Higher Diamondoid | Compound Reference Number | Fraction Number | Elution Time (min.) | Elution Volume (mL) | Elution Volume Relative to 4-1 |
|-------------------|---------------------------|-----------------|---------------------|---------------------|--------------------------------|
| Octamantane #1 | 8-1 | 81 | 280 | 1402 | 2.36 |
| Octamantane #2 | 8-2 | 83 | 285 | 1423 | 2.40 |
| Octamantane #3 | 8-3 | 64 | 244 | 1221 | 2.06 |
| Octamantane #4 | 8-4 | — | — | — | — |
| Octamantane #5 | 8-5 | 63 | 242 | 1211 | 2.04 |
| Octamantane #6 | 8-6 | 79 | 276 | 1381 | 2.32 |
| Octamantane #7 | 8-7 | 71 | 259 | 1296 | 2.18 |
| Octamantane #8 | 8-8 | 84 | 287 | 1434 | 2.41 |
| Octamantane #9 | 8-9 | 74 | 266 | 1328 | 2.24 |
| Octamantane #10 | 8-10 | 80 | 280 | 1402 | 2.36 |
| Octamantane #11 | 8-11 | 85 | 289 | 1445 | 2.43 |
| Nonamantane #1 | 9-1 | 89 | 297 | 1487 | 2.50 |
| Decamantane #1 | 10-1 | 83 | 285 | 1423 | 2.40 |
| Decamantane #2 | 10-2 | — | — | — | — |
| Undecamantane#1 | 11-1 | 101 | 355 | 1774 | 2.99 |

ODS HPLC Whatman ODS-II 10/50
(2 Columns in series), acetone mobile phase @5.0 mL/min.

2002-01-17 09:50:00

FIG. 36

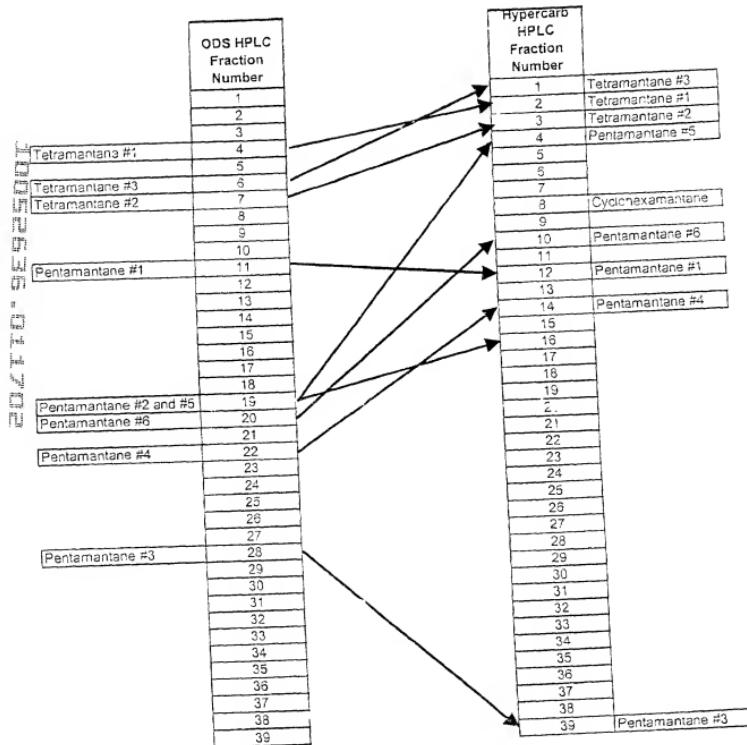


FIG. 37

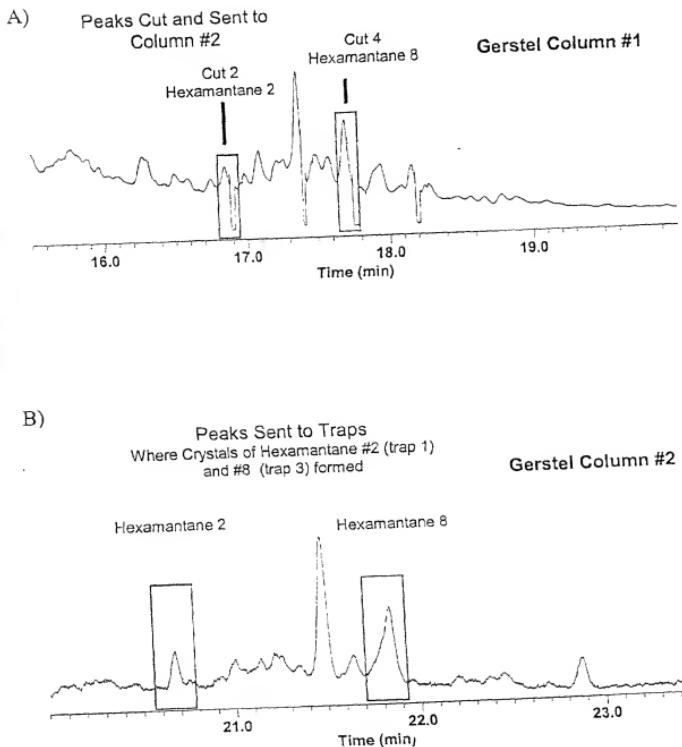


FIG. 38

A)

Crystal of Nonamantane (Mol. Wt. 498)



B)

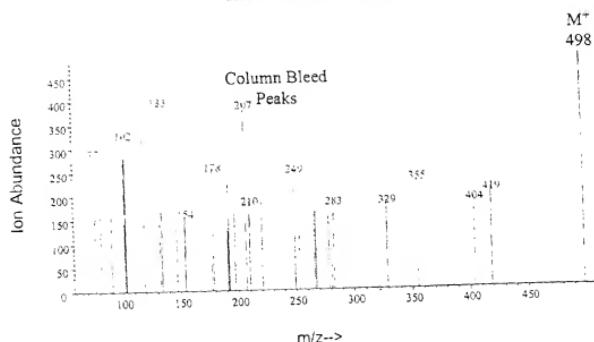
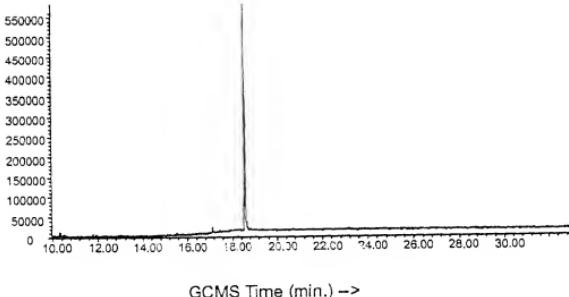
Mass Spectrum of Dissolved Crystal of Nonamantane
Retention time 19.83 min.

FIG. 39

Total Ion Chromatogram

A)

Fully Condensed
Decamantane
18.55 min.



B)

Fully Condensed
Decamantane
18.56

M^+
456

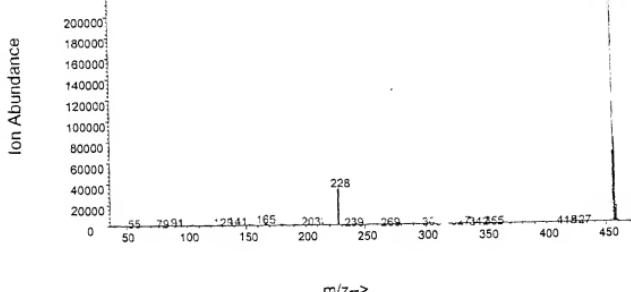
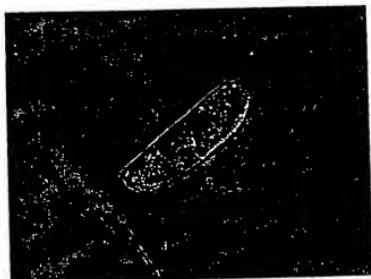


FIG. 40

A)

Crystal of Fully Condensed Decamantane



B)

Mass Spectrum of Dissolved Crystal of Fully Condensed Decamantane
Retention time 18.54 min.

M^+
456

